Refine Search

Search Results -

Terms	Documents
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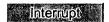
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Search History

DATE: Monday, February 07, 2005 Printable Copy Create Case

Set Name Query

Hit Count Set Name

side by side result set

DB = U	SP1,EPAB,JPAB,DWP1,1DBD; PLUK=1ES; OP	=OK	
<u>L8</u>	(polymerizable adj1 lipid) same (saturated)	44	<u>L8</u>

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END OF SEARCH HISTORY

<u>L1</u> \$sorbpc ___ 0 <u>L1</u>

First Hit Fwd Refs

<u>Previous Doc</u> <u>Next Doc</u> <u>Go to Doc#</u>

Generate Collection | Print

L8: Entry 30 of 44

File: USPT

Nov 22, 1994

DOCUMENT-IDENTIFIER: US 5366881 A

TITLE: Polymerizable lipids for preparing vesicles that controllably release an encapsulant

Detailed Description Text (6):

In another embodiment of this invention, <u>polymerizable lipids</u> of this invention, as defined above, are mixed with non-polymerizable <u>lipids</u>. The non-polymerizable <u>lipids</u> are selected from any non-polymerizable <u>lipids</u>, be they <u>saturated</u> phosphatidylcholines or other <u>saturated</u> lipids, although non-polymerizable phosphatidylcholines are preferred. In the mixtures, up to 90 mole percent, preferably up to 80 mole percent of the non-polymerizable <u>lipid</u> can be used. Examples of non-polymerizable <u>lipids</u> include cationic ammonium surfactants where the two alkyl chains contain 16 to 20 carbon atoms, phosphate surfactants, and <u>saturated</u> phospholipids or <u>saturated</u> phosphatidylcholines which contain the glyceryl backbone, two alkyl chains and a phosphate headgroup. Phosphate surfactants are not phospholipids because they do not contain the glyceryl backbone.

CLAIMS:

- 4. The mixture of claim 3 wherein said non-polymerizable lipid is selected from the group consisting of phosphatidylserines, phosphatidylethanolamines, <u>saturated</u> phosphatidylcholines containing at least one diazobenzene moiety, and mixtures thereof.
- 6. Polymerized vesicles comprising polymerizable lipid or a mixture of polymerizable lipid and up to 90 mole percent of non-polymerizable lipid, said polymerizable lipid having the following structure: ##STR8## where n is 1-10 and m is 15-n; each R is individually selected from the group consisting of:

```
--O--CH.sub.2 --CH.dbd.CH--CH.dbd.CH--CH.sub.3,
```

--OCH.sub.2 CH.dbd.CH.sub.2,

--OC(.dbd.O)--C(CH.sub.3).dbd.CH.sub.2

and

--OC(.dbd.O)--CH.dbd.CH--CH.dbd.CH--CH.sub.3;

and said non-polymerizable lipid being selected from the group consisting of ammonium surfactants, phosphate surfactants, and saturated phosphatidylcholines.

12. A method of encapsulating an encapsulant in vesicles and releasing the encapsulant from the vesicles comprising the steps of:

forming vesicles from at least one lipid selected from the group consisting of polymerizable lipid and mixtures of polymerizable lipid and up to 90 mole percent of non-polymerizable lipid, based on said polymerizable lipid and said non-polymerizable lipid, said polymerizable lipid having the following structure:

##STR9## where n is 1-10 and m is 15-n; each R is individually selected from the group consisting of:

```
--O--CH.sub.2 --CH.dbd.CH--CH.dbd.CH--CH.sub.3,
--OCH.sub.2 CH.dbd.CH.sub.2,
--OC(.dbd.O)--C(CH.sub.3).dbd.CH.sub.2
```

and

```
--OC(.dbd.O)--CH.dbd.CH--CH.dbd.CH--CH.sub.3;
```

said non-polymerizable lipid being selected from the group consisting of ammonium surfactants, phosphate surfactants, and <u>saturated</u> phosphatidylcholines;

encapsulating at least one encapsulant in the vesicles in an amount of about 20-200 by weight, based on the weight of said vesicles; and

subjecting the vesicles to an environmental change which causes the vesicles to release the encapsulant.

13. The method of claim 12 wherein a portion of the encapsulant is disposed on an outside surface of the vesicles and wherein the non-polymerizable lipid is selected from the group consisting of phosphatidylserines, phosphatidylethanolamines, saturated phosphatidylcholines containing at least one diazobenzene moiety, and mixtures thereof.

Previous Doc Next Doc Go to Doc#